REMARKS

COMMENTS ON THE APPLICABILITY OF PRIOR ART established by European Patent Application, EP 0 976 795 A2, "Antifriction Coating for Metals and Process for its Manufacture," Clerici, et al. to the USPTO Application, 10/809,989 Horne, Process for Increasing Strength, Flexibility and Fatigue Life of Metals."

The USPTO examiner noted the following elements in Clerici, et al.'s specification and claims that appeared to anticipate Horne's claims 1-3: **NOTE:** Comments quoted from the Office Action will be printed in italics to assist in contrasting the USPTO statements with those of the inventor, Horne.

The USPTO Office Action states, *"Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Clerici et al. in EP976795 A2.*

"Clerici discloses a method comprising cleaning [0020] – 'hot alkaline cleaner' on steel bolts) and application of an etch ([0020] – pickling by 10% HCl) and surface treatment with a corrosion preventive compound ([0021]-[0023] the 'antifriction coating' which also provides corrosion resistance). Since the method of Clerici is the same as that cited, it is expected to be capable of providing the statements of intended use such as minimizing stress concentration points, minimizing stress intensity factor, and mitigate or prevent crack growth or propagation."

COMMENT: No mention on Clerici's specification or claims is made of an etching procedure. The Clerici Specification [0002] states, "Application of antifriction coatings to substrates is often improved by pretreatment of the substrate surface, for example by phosphate coating, fine sandblasting, pickling or anodizing." The American Society for Metals (ASM) Materials Engineering Dictionary, J.R. Davis 1992, defined "pickling" as, "The chemical removal of surface oxides (scale) and other contaminants such as dirt from iron and steel by immersion in an aqueous acid solution (Fig. 375). The most common

pickling solutions are sulfuric acid and hydrochloric acid." Thus pickling is not to etch the metal, but in contrast, etching in that dictionary involves metal or ceramic removal.

The purpose in Clerici's specification to use 10% HCl was not to affect the apexes of cracks, gouges, scratches, etc. to cause an increase in strength, flexibility, and fatigue life in contrast with values normally expected of the metal. Clerici's Specification [0020] includes, "Substrates are pretreated prior to coating with an antifriction coating to improve adhesion and life in the antifriction coating. Conventional methods of pretreatment include degreasing (for example, using solvents or steam), treatment of corroded surfaces by acid or alkali, phosphating, oxalic acid treatment of stainless steel, sandblasting and anodizing." Clerici's HCl treatment was to clean it of rust to prepare it for phosphating over which a solid antifriction material is overlaid. The Ninth Edition Metals Handbook states, "Phosphate coating is the treatment of iron, steel, galvanized steel, or aluminum with a dilute solution of phosphoric acid and other chemicals in which the surface of the metal, reacting chemically with the phosphoric acid media, is converted to an integral, mildly protective layer of insoluble crystalline phosphate."[1]

Phosphating appears to be most valuable as a base material on the mentioned metals over which paint or some other material will adhere. Perhaps that's why the Metals Handbook (quoted above) said the phosphate crystalline layer is only a ". . . mildly protective layer." But there is no hint within the Horne Application of applying a solid antifriction layer after etching.

The USPTO examiner noted that the Clerici process included a corrosion preventive compound (CPC), so their use of a CPC on the surface of a part anticipates the use of a CPC. In the corrosion control art a corrosion preventive compound is a liquid that is applied by spraying, brushing, or dipping. Although in Clerici's Specification [0003], [0004], [0005], and Claim 1 require a corrosion inhibitor in their process, the technology

[1] Metals Handbook Ninth Edition, Vol. 5, Pg. 434, American Society of Metals, International, Metals Park, OH

of cathodic protection so specified involves a different phenomenon of sacrificial anode material that corrodes in preference to the base metal on which it is electrically attached. Clerici's sacrificial elements are zinc particles, aluminum powder or particles, and a metal phosphate. The Horne technology involves a liquid CPC that has a maximum surface tension of 30-dynes/cm, a wide liquid temperature range to assure a perpetual liquid state, a low vapor pressure to prevent evaporation, and a very low water miscibility. The zinc, aluminum, and metal phosphate do not comply with any of these required parameters [0018]. The cathodic protection materials required by the Clerici patent would fail to do the functions required by Horne technology.

None of the processes claimed in the Clerici patent is even remotely similar and for the same purpose of the processes in the Horne Specification or Claims. Also, the art in the Clerici patent involves the use of solids very active on the galvanic table, zinc and aluminum particles, to make a cathodic protection material which is blended with a solid antifriction material. The claims in the Clerici patent and the claims in the Horne Application are sufficiently different to be viewed as mutually exclusive. In fact the use of phosphating before application of an antifriction material as described in the Clerici patent has been in use for a long time but has not caused others, expert in the art of corrosion or metallurgy, to focus on the root causes of strength, flexibility, and fatigue life impairment. It simply is not obvious and not anticipated by any of the processes mentioned in the Clerici patent. No logic has been found to suggest that the Clerici patent processes would anticipate the processes in Horne's Application claims.

The Clerici patent does not anticipate the use of an etch at all for any purpose. The Horne art provides a totally new purpose for an etch although the etching process may be ancient. Also, the Horne art requires an additional application of a corrosion preventive

compound (CPC) process that provides a synergistic effect of the etching of the tips of cracks and the small radii of scratches, gouges, machine cuts, and etc. for the mentioned metal properties enhancement, the excellence of the Horne art is to combine the effects of the etch synergistically with a means to prevent or mitigate corrosion failure of the metal to metal bonds with an excellent CPC at the post-etch reduced stress intensity factor locations. This synergism is a significant improvement on the present art. Testing has shown not only both treatments are necessary to achieve the maximum possible benefits that the synergism produces, an art with spectacular results.

COMMENTS ON THE APPLICABILITY OF PRIOR ART established by U.S. Patent 2002/0077004 A1, filed Dec. 18, 2000, by Wallace C. Lawrence, Durham, NC (US) titled, "SEPARABLE ELECTRICAL CONTACTS HAVING NON-NOBLE METALLIC ELEMENTS WITH SPECIALIZED SURFACE TREATMENTS FOR HIGH RELIABILITY SIGNAL APPLICATIONS."

The patent examiner stated that Lawrence's art in the above-cited patent anticipates the novelty of Claim 3 of David Hughes Horne's U.S. Patent Application No. 10/809,989, "Process for Increasing Strength, Flexibility and Fatigue Life of Metals."

Lawrence's art employs a known thin liquid, water displacing, corrosion preventive compound (CPC) meeting the requirements of MIL-C-81309E or MIL-L-87177A, Amendment 1 on electrical connector contacts to prevent or mitigate galvanic (dissimilar metals) corrosion. Mil Spec hard gold-plated contacts are plated with nickel over the copper base to provide a base to which the gold plating will adhere. However, the gold plating is known to have "holidays" or "holes" through which the gold and nickel can "see" each other and react as dissimilar metals in which the gold corrodes the nickel. The ability of the electrical circuits, in which the CPC treated connectors are a part, to

transmit analog and digital signals or voltage and current, in electrical circuits, must be maintained at a high level of reliability. The resistance between contacts need to be maintained at less than about 5-milliohms, but gold to gold connector contacts within a few months on aircraft can have resistances greater than 50-milliohms within a year if the connector is not treated with a good CPC.

The Horne application suggests the use of an excellent CPC for a very different purpose than the art claimed by Lawrence.

The excellence of the corrosion preventive compounds to prevent galvanic corrosion between the nickel plating and the gold plating, between which are holidays, that keep the resistances across electrical contacts small does not infer that it will have any effect on the strength, flexibility, or fatigue resistance of metals. If knowing the existence of a CPC were all one needed to know to recognize that it could improve metal strength, flexibility, and fatigue life, some of the hundreds of CPC manufacturers and millions of CPC users of in the last 75-years, in which CPCs have been manufactured, would have begun treating metals using it long ago. But that has not happened. Numerous instances of the CPC use are known where electrical contacts were treated to prevent dissimilar metal corrosion, which if not protected eventually could lead to circuit failures. But none of such uses are known to have been cited for improving the fatigue life, flexibility, and strength of the metal. It simply is not obvious even to an expert in the technology of either corrosion control or metals technologies, and there are many thousands of experts in metals technologies and corrosion control.

Completely unrelated to the electrical connector CPC treatment, it was not until the inventor struck on the idea to etch metal to reduce stress concentrations that he then saw the need of a CPC to protect the metal bonds after etching (during atom to atom bond

stretching that causes high bond potential energy storage due to tension, compression, or shear stresses). Battelle fatigue research showed aircraft aluminum treated only with CPCs resulted in as much as 200 times increased fatigue life in 2024T6, and the MIL-L-87177 treated dog-bones resulted in the longest fatigue life. However, the synergistic effect of an etch and CPC is expected to make greater improvements. Thus, the excellence of a CPC in connectors didn't anticipate the novelty of treating metals to increase the strength, flexibility, and fatigue life in comparison with untreated parts.

The Horne U.S. Patent Application recommended MIL-L-87177 as a known excellent CPC but didn't specify any specific CPC use. Instead, Horne provided parameters with some levels that would be expected to provide the corrosion preventive ability to protect the metal to metal bonds. But the use of a proper etch for the metal with an excellent CPC to synergistically enhance the stated metal properties is a significant improvement on the present art.

Under "Specification" in the Referenced Office Action, page 2 to correct the case of tradenamed products and a grammatical error:

(a) As noted by the examiner, request that the trademark or tradename "SUPER CORR B" noted in TABLE II on page 3 be amended to read "SUPER CORR A or B in upper case letters.

Reasons for Change: The Environmental Protection Agency has prohibited the manufacture of HCFC 141b solvent (with possible exceptions) which was in SUPER CORR B so it no longer is made in the United States. SUPER CORR A is the replacement product which Battelle testing has shown is as effective to prevent corrosion as the SUPER CORR B. However, there still is some SUPER CORR B in existence

which the EPA allows to be used for aircraft servicing. In addition, LektroTech has moved, but a new telephone number for the marketing manager is "(813) 390-7800."

(b) A second CPC vendor noted in TABLE II is the International Lubricants and Fuel Consultants (ILFC), Rio Rancho, NM which manufactures a product called "1006 CON-TAC" that in the Application was written in mixed, upper and lower, case, also. Their product, too, should be in upper case only.

(c) On page 3, Paragraph [0020], line 20 beginning with ". . . elevating the temperature to 200°F. at . . ." delete the word "at."

Under "Claim Rejections – 35 U.S.C. 112" by the examiner (Referenced Office Action, page 2):

(a) The examiner stated, "Claims 2-3 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for using SUPER CORR B, does not reasonably provide enablement for any corrosion preventive compound." Skipping a sentence the examiner also wrote, "The specification enables the use of SUPER CORR B as a corrosion preventive compound, but does not enable the use of any corrosion preventive compound.

Response: Table II on page 3 of the Application in which SUPER CORR B is mentioned also mentions The International Lubricant and Fuels Consultants' product 1006 CON-TAC (which should be in upper case, too). The following explains why not just any product labeled as a corrosion preventive compound should be considered acceptable for the use of this technology.

Beginning in 1990 extensive laboratory and field corrosion testing of gold-plated electrical connector contacts and 1010 steel test-plates performed by Battelle Columbus for the US Air Force was reported at the IEEE Hulm Conference in 1996 by Battelle's

principle investigator, Dr. William H. Abbott[2]. Abbott revealed that of twelve prominent products being purchased by the DOD that were touted to be corrosion preventive compounds (CPCs), four actually accelerated corrosion in some tests, six products had some corrosion inhibiting ability, but only two were deemed excellent corrosion inhibitors or truly corrosion preventive compounds (CPCs) in laboratory salt spray tests and in long term, two year, outdoor tests at 10 field sites. Battelle's principal scientist for the study called the five companies that were selling the "corrosive CPCs" and asked what testing they had done that demonstrated their product's corrosion preventive abilities, and none of those companies had done any testing to see if their product truly prevented corrosion. But three of the four corrosive products claimed to be CPCs were qualified products for MIL-C-81309. One of the two which was considered as an excellent CPC in Battelle tests was not recommended in TABLE II of the patent application, because the flash point of that CPC spray was lower than zero-degrees Fahrenheit (a potential flame thrower). The Sandia Labs did the corrosion preventive testing on the 1006 CON-TAC.

This testing does not mean these could be the only effective CPCs. Indeed, the Specification Paragraph [0019] expressly states, "The two preferred products presented in Table II used in the testing are known to be excellent corrosion preventive compounds. They conform to MIL-L-87177A, and any CPC to be considered for use that conforms to MIL-L-87177A (or later revision), Grade A or B probably will provide the corrosion resistance to achieve optimum results from the invention but are not considered limiting of the invention." The Grade A is an improved formula developed on a USAF testing

[2] Metals Handbook Ninth Edition, Vol. 5, Pg. 434, American Society of Metals, International, Metals Park, OH

contract to identify the SUPER CORR B base material with a more environmentally friendly solvent.

The Summary of the Invention, [0014], states after cleaning, etching, rinsing and drying the metal surface, ". . . coating the surface with a water displacing, low surface tension corrosion preventive compound" which could describe several if not many commercial corrosion preventive compounds.

Also, in paragraph [0018], the application of the CPC and its desired characteristic parameters are expanded to include a low surface tension (preferably less than 30-dynes/cm), a wide liquid temperature range to assure a perpetual liquid state, a low vapor pressure to prevent evaporation from the treated surface to at least 300°F, and very low water miscibility." Paragraph [0018] concludes, "Table II lists some recommended CPCs for most metals."

Thus, of the hundreds of products on the market claimed to be corrosion preventive compounds some really are not true CPCs, but there may be others that could qualify.

(b) Also under "Claim Rejections – 35 U.S.C. § 112 the second sentence after quoting the Code and stating "Claims 2-3 are rejected . . ." the Office Action reads, "The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims."

Response: The specification documents the procedures beginning in paragraph [0014] and continuing with [0015], [0016], [0017], [0018], and [0019] which provide substantial detail to enable a person skilled in the art of metalworking and to make and use the process.

On page three of the Office Action, the examiner rejected claims 1-3 as being indefinite citing several words in the text as relative terms. It is agreed that some of the terms are indefinite, so the claims are amended, however a few of the terms are used normally in the art.

The first of these words is "minimizing," which is used in the context as reducing something to a reasonably acceptable level for the expected environment considering the ability of the technical art, the costs, and impacts of failure. Minimizing is understood by metals and corrosion control artisans as equivalent to "prevention" (if absolute prevention were possible for even some defined time) in contrast with the conditions or service life expected of untreated metal.

Examples of the use of the word "minimizing" by those expert in this art are in a chapter of the American Society of Metals (ASM International) Handbook Volume 13A, <u>Corrosion: Fundamentals Testing, Protection</u>, 2003 "Designing to Minimize Corrosion," pp. 929-939. Minimizing corrosion is used in context as the editor of this section of the book stated, "Design can never be absolute, often decisions are a compromise based on cost and availability of materials and resources" (pg. 929). *See* Attachment A.

The examiner also noted the word "mitigate" as an indefinite word like "minimize" which also is understood by the artisans in the metals art reducing some condition in comparison with untreated or unprotected metal by doing the best one can do under the circumstances. Mitigate also is used in the ASM Handbook, pp 245-246 and 295-296. See Attachment B.

Applicant respectfully requests the Examiner's reconsideration of the rejection and passage of the claims to allowance. Should the examiner have any questions, she is requested to call Applicants' undersigned attorney collect at (801) 521-3200.

Respectfully submitted,

K. S. Cornaby
Attorney for Applicant
Jones Waldo Holbrook & McDonough PC
170 South Main Street, Suite 1500
Salt Lake City, UT 84101

O I P E

SEP 22 2006

PATENT & TRADEMARK OFFICE

CERTIFICATE OF MAILING

I certify that this Amendment is being deposited with the United States Postal Service as Express Mail EV 817928241 U.S. in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on September 22, 2006.

Roberta M. Kelly

Roberta M. Kelly